

The questions signed by * are hard: read their explanation. ● Past Years ● TBL ● Others

This file belongs to the PULSE Cardiology question book: the explanations of the multiple choice answers and the model answers of the essay questions, in the words of the handout.

Answer Key | Multiple Choice Questions

Question no.	1	2	3	4	5	6	7	8	9	10	11	12
Answer	d	d	c	a	b	a	a	c	d	a	a	c

Question no.	13	14	15	16	17	18	19	20	21	22	23	24
Answer	a	d	c	a	a	b	a	b	b	a	d	d

Question no.	25	26	27	28	29	30	31	32
Answer	d	d	b	b	c	d	d	a

► Second | Questions with a Note

Question no.	1
Answer	a

► Why this answer?

- Which of the following is the best emergency treatment of patient with complete heart block?
(d) Temporary pacemaker
The emergency treatment of an unstable bradyarrhythmia is temporary pacing, transcutaneous or transvenous. Atropine is usually temporary, for patients with no temporary pacing; DC shock is for tachyarrhythmias and amiodarone slows conduction further.
- In a patient with daily rapid palpitations of sudden onset and offset and normal resting ECG in the...
(d) Ambulatory ECG monitoring.
The resting ECG is normal between attacks, so the rhythm must be recorded during an attack; with daily attacks, short term ECG recording by Holter monitoring will catch one.
- Which of the following arrhythmia is characterized with AV dissociation (variable PR interval)?
(c) 3rd degree heart block
In complete (third degree) heart block no atrial impulse reaches the ventricles, so P waves and QRS complexes are independent and the PR interval varies (AV dissociation). In Mobitz type II the conducted beats keep the same PR interval; the handout lists both under AV nodal blocks.

- 4 In a 34 years old male patient with atrial fibrillation and uncontrolled ventricular rate for 4 days with no...
(a) Propafenone
 AF for 4 days is more than 48 hours, and without transesophageal echo restoring sinus rhythm carries a high risk of thromboembolism, so rate control is chosen. Propafenone restores sinus rhythm, so it is avoided, while diltiazem (rate control) and rivaroxaban (anticoagulation) fit the plan.
- 5 Which of the following is a differential diagnosis of narrow complex arrhythmia?
(b) Atrial flutter.
 Tachycardia is classified by QRS width and site of origin. Atrial flutter is supraventricular, so the QRS is narrow (< 120 msec); ventricular tachycardia, ventricular flutter and pre-excited AF give wide QRS complexes.
- 6 Which of the following is not a line of treatment of supraventricular tachycardia.
(a) IV heparin
 IV adenosine, IV verapamil and IV beta blockers such as metoprolol are AV node blocking strategies for supraventricular tachycardia. Heparin is a parenteral anticoagulant, given in atrial flutter and AF, not in supraventricular tachycardia.
- 7 The following drug is recommended for rhythm control of a patient with recent onset atrial fibrillation with...
(a) Propafenone
 With no structural heart disease, rhythm control is by class IC drugs, propafenone or flecainide. Sotalol is for structural heart disease, bisoprolol is for rate control and adenosine is for supraventricular tachycardia.
- 8 A 75 years old patient with recurrent syncopal attacks and complete heart block, what is the emergency...
(c) Temporary pacemaker
 The emergency treatment of an unstable bradyarrhythmia is temporary pacing. A permanent pacemaker is the later definitive treatment, atropine is for patients with no temporary pacing, and DC shock is for tachyarrhythmias.
- 9 A patient with supraventricular tachycardia and acute pulmonary edema, which is the emergency treatment?
(d) DC shock
 Acute pulmonary edema means heart failure, so the patient is unstable and needs emergency DC shock. Carotid massage, adenosine and amiodarone are for stable patients.
- 10 A patient has rapid onset and offset of chest pain. Which of the following tests can the patient do out of...
(a) Holter monitoring
 Holter monitoring is short term ambulatory ECG recording, done while the patient goes about his day out of the clinic. Stress ECG, MRI and echo are done inside the hospital.
- 11 A 75 years old patient with recurrent syncopal attacks with sinus bradycardia, what is the emergency...
(a) IV atropine
 For symptomatic sinus bradycardia the first emergency step is IV atropine (0.5 to 1 mg), which blocks vagal tone on the sinus node. Temporary pacing is used if atropine fails, and it is the first emergency step in complete heart block, where atropine usually does not work. A permanent pacemaker is the later definitive treatment, and DC shock has no role.
- 12 A patient with stable supraventricular tachycardia, which is the first line treatment?
(c) Carotid massage
 In stable supraventricular tachycardia the first AV node blocking strategy listed is vagal maneuvers such as carotid massage, before IV adenosine and the other drugs.
- 13 * A 26 years old female patient presented with atrial flutter and anterior wall MI which of the following...
(a) Ivabradine
 This is inferred from the handout: ivabradine is used for inappropriate sinus tachycardia, and it is a funny Na channel blocker of the sinus node, so it does not control the rate in atrial flutter. Rivaroxaban is used for anticoagulation, and bisoprolol and non-DHP CCBs such as verapamil control the rate.
- 14 The following is not an indication of pacemaker implantation.
(d) Right bundle branch block
 Heart block can be associated with bradycardia or not; complete heart block, Mobitz type II and sinus node disease with chronotropic incompetence give a slow rate needing pacing. Isolated right bundle branch block does not slow the heart and needs no pacemaker.

- 15 * The following statement is False regarding supra ventricular arrhythmia:
(c) Pregnant women with cardiogenic shock and with...
 This is inferred from the handout: shock makes the patient unstable, and unstable arrhythmia is treated by rapid restoration of sinus rhythm with DC shock, so (c) is false. Anticoagulation is part of AF treatment, and its extension depends on the thromboembolic risk profile.
- 16 For a patient admitted with acute atrial fibrillation lasting for more than 48 hours and hemodynamically...
(a) Immediate intravenous amiodarone.
 After 48 hours, restoring sinus rhythm carries a high risk of thromboembolism, so rate control is chosen. Immediate IV amiodarone restores sinus rhythm and is avoided; rate control, parenteral anticoagulation and transesophageal echo are correct steps.
- 17 The following is the favorable intra-venous drug to rapidly control heart rate in patient with decompensated...
(a) IV digoxin
 In AF with structural heart disease, rate control is by IV digoxin, and oral digoxin is used if AF is associated with heart failure. IV metoprolol and verapamil are for patients with no structural heart disease.
- 18 The best emergency treatment of second-degree AV block Mobitz type II (6:1 block) is:
(b) Temporary pacemaker
 The emergency treatment of an unstable bradyarrhythmia is temporary pacing. Drugs such as atropine are usually temporary, for patients with no temporary pacing, and DC shock is for tachyarrhythmias.
- 19 Which of the following is the treatment of choice for hemodynamically unstable patients with atrial...
(a) Direct current (DC) cardioversion
 An unstable patient with AF needs DC cardioversion. Rate control and amiodarone are for stable patients, and a pacemaker treats bradyarrhythmia.
- 20 Which of the following is the definition of bradyarrhythmia?
(b) Heart rate less than 60 beats per minute
 Bradyarrhythmia is any heart rate of 60 beats per minute or less.
- 21 Which of the following is defined as a tachyarrhythmia?
(b) Heart rate >100 beats per minute
 Tachyarrhythmia is a heart rate of 100 beats per minute or more, with or without abnormal rhythm.
- 22 Which of the following is the treatment of choice for symptomatic bradycardia due to sinus node dysfunction?
(a) Atropine
 Atropine and atropine derivatives are the drugs listed for bradyarrhythmia, and atropine is the only rate-raising choice here. Beta blockers slow the heart more, and defibrillation and cardioversion are for tachyarrhythmias.
- 23 Which of the following can cause supraventricular arrhythmias:
(d) All of the above
 Ischemic heart disease and myocarditis are listed causes of tachyarrhythmia, and arrhythmias, especially AF, are complications of dilated and hypertrophic cardiomyopathy. So all three can cause supraventricular arrhythmias.
- 24 Urgent treatment in hemodynamically unstable patient with Atrial fibrillation is:
(d) DC- cardioversion
 An unstable patient with AF needs DC cardioversion to restore sinus rhythm. Beta blockers and digoxin only slow the rate in stable patients, and ACE inhibitors do not treat AF.
- 25 COVID-19 can cause the following arrhythmia:
(d) All of the above
 COVID-19 causes fever, myocarditis and electrolyte disturbance, which are physiologic, inflammatory and electrolyte causes of tachyarrhythmia. So it can cause sinus tachycardia, AF and ventricular tachycardia.
- 26 AV- block associating acute myocardial infarction:
(d) Usually patients with AV block and anterior wall MI will...
 AV block in MI is more serious in anterior wall MI and more frequent and benign in inferior wall MI, so (a), (b) and (c) are wrong. The serious block of anterior wall MI usually needs a pacemaker.

- 27 * Which of the following is not a cause of sinus bradycardia?
(b) Complete heart block
 This is inferred from the handout: complete heart block is an AV nodal block, apart from sinus bradycardia, which is an SA nodal disorder. Myxoedema (endocrine), hypothermia and obstructive jaundice slow the sinus node itself.
- 28 Atrial fibrillation leads to:
(b) Irregular pulse with pulse deficit
 AF makes the pulse irregular, and some weak early beats do not reach the wrist, so the apical rate is higher than the pulse rate (pulse deficit).
- 29 Cardiac arrest may be due to:
(c) Pulseless ventricular tachycardia
 Ventricular tachycardia may cause sudden cardiac arrest, and pulseless ventricular tachycardia is an arrest rhythm. Ectopics, atrial flutter and Wenckebach block keep a cardiac output.
- 30 Drug of choice in acute management of PSVT is:
(d) Adenosine
 After vagal maneuvers, IV adenosine, a short acting AV node blocking agent, is the first drug listed for stable supraventricular tachycardia.
- 31 Hyperthyroid heart disease is manifested by:
(d) Paroxysmal atrial fibrillation
 Hyperthyroidism is an endocrine cause of tachyarrhythmia, and AF, often paroxysmal, is its typical arrhythmia. It raises the cardiac output (high COP state), so low output, prolonged circulation time and pericardial effusion do not fit.
- 32 Which of the following ECG findings is associated with sudden cardiac death?
(a) Prolonged QT interval
 Long QT syndrome commonly leads to ventricular tachycardia, and ventricular tachycardia carries a risk of sudden cardiac death. First-degree AV block, RBBB and ventricular ectopics are usually benign.

► Second | Questions with a Note: why this answer?

- 1 Which of the following is the best emergency treatment of ventricular tachycardia.
(a) DC shock
 Ventricular tachycardia is treated by restoring sinus rhythm with DC shock regardless of hemodynamic status. Verapamil and adenosine are for supraventricular tachycardia, and beta blockers are for long term prevention.

Model Answers | Essay Questions

- 1 Outline the treatment lines of supraventricular tachycardia.

Treatment

- ① **Emergency treatment** (unstable patients with severe hypotension or shock, heart failure, chest pain):
 - Circulatory support (IV line fluids and circulatory support).
 - Monitoring.
 - Rapid restoration of sinus rhythm, using electric cardioversion or defibrillation (DC shock).
- ② Removal of the cause, and treatment of the primary condition.
- ③ Life-style modification (avoiding certain foods and drinks, modifying physical activity, improving the quality of sleep, relieving stresses).
- ④ Pharmacological / interventional treatment: according to the type of arrhythmia.

Supraventricular tachycardia: acute treatment

- ① In hemodynamically unstable patients: **DC shock**.

- ② In stable patients: you aim to abort the tachycardia with one of the following AV node blocking strategies:
- Vagal maneuvers: carotid massage or induced vomiting.
 - IV adenosine: short acting AV node blocking agent.
 - IV non-dihydropyridine CCB (verapamil).
 - IV beta blockers.
 - IV digoxin.
 - IV amiodarone.

Supraventricular tachycardia: long term treatment

- ① Medications to prevent recurrence:
- Beta blockers.
 - Non-dihydropyridine CCB (verapamil).
 - Amiodarone.
- ② **EP study and catheter ablation** to cure the patient and stop the need for long term anti-arrhythmic drugs.

- 2 Discuss the treatment strategy of a patient with stable atrial fibrillation presenting after 48 hours. (Also asked as: Treatment lines of a patient with late onset (> 48 hours) uncontrolled atrial fibrillation with normal blood pressure.)**

Treatment

- ① Removal of the cause, and treatment of the primary condition.
- ② Life-style modification (avoiding certain foods and drinks, modifying physical activity, improving the quality of sleep, relieving stresses).
- ③ Pharmacological / interventional treatment: according to the type of arrhythmia.

Atrial fibrillation: acute treatment

- ① **Anticoagulation:** IV loading of parenteral anticoagulation.
- ② If the onset of arrhythmia occurred **more than 48 hours**, the risk of thromboembolism will be high if you restored sinus rhythm unless you checked the patient with transesophageal echo. Therefore, **rate control** (slowing AV nodal conduction) will be appropriate:
- No structural heart disease: IV BB or non-dihydropyridine CCB.
 - Structural heart disease: IV digoxin.

Atrial fibrillation: long term treatment

- ① **Anticoagulation:**
- If valvular (mitral stenosis) or prosthetic valve: VKA anticoagulation (warfarin) after bridging therapy with parenteral anticoagulation till reaching INR (2-3).
 - If not: VKA or DOAC (rivaroxaban or apixaban) anticoagulation for one month. Extension of the anticoagulation treatment after one month will depend on the thromboembolic risk profile of the patient.
- ② Maintenance of sinus rhythm for patients who underwent rhythm control strategy:
- No structural heart disease: class IC (propafenone, flecainide).
 - Structural heart disease: class III (amiodarone, sotalol).
 - EP study and catheter or surgical ablation (maze procedure): curative.
- ③ Maintenance of rate control for patients who underwent rate control strategy:
- Selective beta blockers: oral bisoprolol, metoprolol, nebivolol.
 - If BB contraindicated: oral non-dihydropyridine CCB (diltiazem).
 - If associated with heart failure: oral digoxin.

After **one month** of adequate anticoagulation and rate control for patients with AF presented more than 48 hours, restoring sinus rhythm can be safely done as in rhythm control:

- * If hemodynamically unstable: DC cardioversion.
- * If stable: pharmacological cardioversion by antiarrhythmic drugs:
 - If no structural heart disease: class IC (propafenone, flecainide).
 - If structural heart disease: class III (amiodarone).

3 Enumerate lines of management of ventricular tachycardia.

Treatment

- ① **Emergency treatment** (unstable patients with severe hypotension or shock, heart failure, chest pain):
 - Circulatory support (IV line fluids and circulatory support).
 - Monitoring.
 - Rapid restoration of sinus rhythm, using electric cardioversion or defibrillation (DC shock).
- ② Removal of the cause, and treatment of the primary condition.
- ③ Life-style modification (avoiding certain foods and drinks, modifying physical activity, improving the quality of sleep, relieving stresses).
- ④ Pharmacological / interventional treatment: according to the type of arrhythmia.

Ventricular tachycardia

- ① **Acute management:** restoring sinus rhythm with DC shock regardless of hemodynamic status.
- ② **Long term management** to prevent recurrence:
 - Beta blockers or class III antiarrhythmic drugs.
 - EP study and catheter ablation.
- ③ **Device (ICD) implantation** could be considered to prevent risk of sudden cardiac death.

4 List the intravenous drugs that could be used for acute termination of supraventricular tachycardia in a patient who has dilated cardiomyopathy and reduced ejection fraction.

In stable patients with supraventricular tachycardia, you aim to abort the tachycardia with one of the following AV node blocking strategies:

- * IV adenosine: short acting AV node blocking agent.
- * IV non-dihydropyridine CCB (verapamil).
- * IV beta blockers.
- * IV digoxin.
- * IV amiodarone.

Note The handout does not say which of these drugs to choose when the ejection fraction is reduced, answer incomplete.